WE CLAIM:

1. A method of measuring a temperature of a target medium having a wavelength-dependent emissivity and emitting electromagnetic radiation related to the temperature, the temperature being measured with a radiometric temperature measurement system having radiation transmission losses, the method comprising:

positioning at least a first electromagnetic radiation sensor relative to the target medium such that the electromagnetic radiation emitted by the target medium is incident upon at least the first electromagnetic radiation sensor;

coupling a wavelength selective element to at least the first sensor, such that at least the first sensor receives at least one of a first and a second wavelength range of the electromagnetic radiation;

generating by at least the first sensor a first and a second sensor signal;

varying the temperature of the target medium; and

calculating a temperature of the target medium by processing the first and second sensor signals in a manner that is independent of the radiation transmission losses and the wavelength-dependent emissivity of the target medium.

2. The method of claim 1, in which the wavelength selective element includes a switchable wavelength selective element that causes the first sensor to alternately receive the first and second wavelength ranges of the electromagnetic radiation.

3. The method of claim 2, in which the first sensor generates the first and second sensor signals in response to alternately receiving the first and second wavelength ranges of the electromagnetic radiation.

4. The method of claim 1, further including positioning at least a second electromagnetic radiation sensor relative to the target medium such that the electromagnetic radiation emitted by the target medium is incident upon at least the first and second electromagnetic radiation sensors.

5. The method of claim 1, further including coupling a wavelength selective element to at least a second sensor, such that the first sensor receives the first wavelength range of the electromagnetic radiation, and the second sensor receives the second wavelength range of the electromagnetic radiation.

6. The method of claim 5, in which the first sensor generates the first sensor signal, and the second sensor generates the second sensor signal.

7. The method of claim 1, in which calculating the temperature includes measuring a rate of energy change at the first and second wavelength ranges of the electromagnetic radiation.

8. The method of claim 1, in which the target medium includes a semiconductor wafer.

9. The method of claim 1, in which at least the first sensor includes a probe element including a light guide formed from a material including aluminum oxide crystals.

10. The method claim 9, in which the light guide formed from aluminum oxide crystals includes at least one of a yttrium aluminum garnet (YAG) and yttrium aluminum perovskite (YAP).

11. The method of claim 1, in which at least the first sensor includes a probe element including a light guide material including at least one of quartz and sapphire.

12. The method of claim 1, in which at least the first sensor include a solid-state detector material including gallium aluminum arsenide (GaAlAs).

13. The method of claim 12, in which the solid-state detector material includes a spectral response characteristic having a radiation response that peaks at about 900 nm and diminishes by about three orders of magnitude at 1,000 nm.

14. The method of claim 1, further including a hot/cold mirror positioned between the target medium and at least the first sensor, the hot/cold mirror reflecting back to the target medium electromagnet radiation that is not substantially within at least one of the first and second wavelength ranges.

15. The method of claim 1, in which the calculating a temperature of the target medium includes employing a data table.

16. The method of claim 1, in which the processing of the first and second sensor signals includes averaging at least one of the first and second sensor signals.